

REVIEW

Screening for vulnerability to psychological disorders in the military: an historical survey

E Jones, K C Hyams, S Wessely

J Med Screen 2003;10:00-00

See end of article for authors' affiliations

Correspondence to:
Professor S Wessely,
Department of
Psychological Medicine,
Guy's, King's and St
Thomas's School of
Medicine, 103 Denmark
Hill, London SE5 8AZ, UK;
s.wessely@iop.kcl.ac.uk

Accepted for publication
13 March 2003

Objectives: To evaluate attempts in the military to screen for vulnerability to psychological disorders from World War I to the present.

Methods: An extensive literature review was conducted by hand-searching leading medical and psychological journals relating to World Wars I and II. Recent publications were surveyed electronically and UK archives investigated for British applications.

Results: Despite the optimism shown in World War I and the concerted efforts of World War II, follow-up studies showed that screening programmes did not succeed in reducing the incidence of psychological casualties. Furthermore, they had a counter-productive effect on manpower, often rejecting men who would have made good soldiers. Continued experimentation with screening methods for psychiatric vulnerability failed to yield convincing results during the post-war period.

Conclusions: Although well-measured variables, such as intelligence, have been shown to predict success in training and aptitude, no instrument has yet been identified which can accurately assess psychological vulnerability. Previous attempts have failed because of false-positives, false-negatives and reluctance in the target population because of stigma. Early findings suggest that psychological surveillance, if not screening, may yield valuable results when applied to military populations exposed to stress.

Screening for any disorder has an intuitive appeal, and if disorders can be identified before they have become apparent the rewards are even greater. Psychiatric disorders, once established, are often difficult to treat and often have a major impact on the person and society. Hence, numerous attempts have been made to screen not just for established psychiatric disorders but for vulnerability to those disorders. Few organisations have been more concerned with these issues than the military. Recruits who fail in training or leave the service early are a major drain on resources. Servicemen who develop psychiatric disorders often function poorly, while soldiers who develop psychological disorders after combat are rendered ineffective for future service and are likely to qualify for financial assistance.

In this paper, we review the literature on screening for vulnerability to psychological disorders in the armed forces during the last century. The identification of those at risk of later psychiatric breakdown when exposed to stress (in this context largely combat) is the principal focus, though the related issue of screening for military suitability is also addressed. Nearly 90 years of attempts to identify those who may break down in battle provide important lessons not just for the services but for other organisations, such as the police and fire-fighters, whose staff are subjected to traumatic situations.

METHODS

An extensive literature review was conducted by hand-searching leading medical and psychological journals relating to World Wars I and II. Recent publications were surveyed electronically using Medline, PsychLit, PubMed and PILOTS, while the *Journal of Traumatic Stress* was hand-

searched. In addition, the major UK archives were investigated for British applications.

Experimental phase

Screening for psychiatric vulnerability, that is the identification of those at risk of developing an adverse outcome but who have yet to show manifest signs, began with the US Army during World War I. Observers had witnessed the high incidence of psychiatric battle casualties in the British and French armies and were anxious to avoid such losses when America entered the war in April 1917. Thomas Salmon recommended screening to exclude "insane, feeble-minded, psychopathic and neuropathic individuals from the forces" to "reduce very materially the difficult problem of caring for mental and nervous cases in France, increase the military efficiency of the expeditionary forces and save the country millions of dollars in pensions".¹

At first, only those recruits who had come to the attention of their company commanders or medical officers because of inappropriate behaviour or abnormal symptomatology were referred for neuropsychiatric assessment. When soldiers began to break down in France with diagnoses of shell shock, the screen was considered too weak and specialists were routinely attached to survey board centres.² Nevertheless, assessments remained brief, relying largely on the judgement of a few individuals. As a result, rejection rates varied greatly between induction centres.

In part, psychological screening was linked to intelligence testing and owed much to the work of Dr Robert Yerkes, director of the US Army Psychological Testing Corps. He headed a task force of psychologists who set out to impose blanket testing of recruits not only to exclude those of low intelligence but also to assess their abilities and potential.³

Various instruments were designed to assist officer selection and rating, together with assignment to particular trades. This represented the first attempt to predict the best soldiers rather than identify those most likely to suffer from a psychological disorder. A paper and pencil survey, correlated with the standardized Stanford-Binet intelligent test, was developed for the military. In 1917, Yerkes, with the help of Lewis Terman, David Wechsler and others, developed multiple-choice Army Alpha and non-verbal Beta tests to measure both literate and illiterate subjects.⁴

In November 1917, Colonel Henry Shaw reported favourably to the Surgeon General, recommending "that the [screening] scheme be extended to include all enlisted and drafted men and all newly appointed officers, provided competent psychologists can be found to take charge".⁵ In the same year, Robert Woodworth devised the personal data sheet, the first group personality test and forerunner of the current Minnesota Multiple Personality Inventory, and this was used briefly to screen recruits. However, a cable sent from General Pershing in July 1918 implied that the effectiveness of these instruments was qualified: "Prevalence of mental disorders in replacement troops recently received suggests urgent importance of intensive efforts in eliminating mentally unfit from organisation's new draft prior to departure from United States".⁶

During World War I, 72,000 (2%) US recruits were rejected on neuropsychiatric grounds either at boards or in training.⁷ Draft boards screened out 15.1 men per 1000 registrants for psychopathy and allied mental disorders,⁸ while a further 0.5% were discharged at their first military station. Latterly, Ginzberg *et al.* calculated that 68,000 (1.4%) recruits were rejected at enlistment, and a further 35,000 (0.9%) were discharged from the armed forces with neuropsychiatric disorders.⁹

In February 1919, it was calculated that only 4039 (0.2%) servicemen had been invalided from the American Expeditionary Force in France with psychological disorders. This was considered a success, given that 3181 soldiers had been sent overseas against psychiatric advice.² Yet no attempt was made to discover how many of the deployed men who had failed the screen were among the 4039 evacuated to the United States. Equally, no follow up was conducted to discover what proportion of the 3181 performed efficiently when in battle. Other studies also created the impression that psychological testing had worked. A follow-up study of 763 veterans with so-called war neuroses showed that 36.9% were fully recovered by 1924–25, while a further 43.9% functioned at close to full civilian efficiency.¹⁰ However, these statistics did not take account of the large number of pensions awarded for war syndromes such as neurocirculatory asthenia and other somatoform disorders. The variable and experimental nature of these early attempts at selection led to the general conclusion that more effective screening measures were needed; faith in the process itself had not been disturbed.¹¹

Screening: World War II

The high watermark of screening by the military for vulnerability to psychological disorders came in World War II. The outbreak of hostilities was greeted with warnings about the past, references being made to the immense cost imposed by the large numbers of psychiatrically damaged servicemen after World War I.^{12,13} In the US, Hilman argued that "a superior army cannot be moulded from inferior individuals",¹⁴ and Sutton believed that these "inferior" individuals could be readily identified.¹⁵ To combat the mistakes

of the past, great faith was placed in selection processes.^{16,17} Davidson, a military psychiatrist, wrote "if we thus set up filters against the defective, the unstable and potentially neurotic . . . we'll go far towards drying up our post-war neurotics at source and so lighten the load of the Veteran's Bureau".¹⁸ Statistical weight was added to these claims in 1941 when a survey of 200 servicemen with psychiatric disorders admitted to Christie St. Hospital, Toronto, led Baillie to conclude that 68 (34%) had "obvious symptoms on enlistment". A short neuropsychiatric examination, he argued, would reduce the number of unsuitable soldiers "to a very minor figure".¹⁹

Medical Circular No. 1, issued in November 1940 by the US Selective Service System, made psychiatric screening an essential part of mass mobilisation, while *Circular Letter No. 19*, issued by the Surgeon General in March 1941, attempted to impose common standards at induction stations. Introduced in a spirit of optimism, Colonel Stanley, First Corps Area Surgeon, argued that the induction neuropsychiatric examination should prevent at least 75% of potential casualties.²⁰ However, there were too few psychiatrists to conduct even rudimentary examinations of recruits during the emergency build-up of wartime forces. Given the range of information that was to be gathered,²¹ assessors had to rely on self-completed Forms 149 and 200 supplied by the Selective Service. The first included a brief personal and family history, while the second related to school and work record. Furthermore, in the early stages of the war some psychiatric assessments were of a subjective and idiosyncratic nature.²²

To allow psychiatrists to concentrate their efforts on borderline cases, John Appel, chief of preventative psychiatry of the Surgeon General's Office, led a search for a screening questionnaire that would identify a subpopulation who required more careful assessment. The Information and Education Division, Army Service Forces, designed the instrument (Neuropsychiatric Screening Adjunct or NSA), though by the time of its adoption in October 1944, pressure on military psychiatric services had passed and it was never employed as intended.²³

United Kingdom

In the UK, screening had a different rationale. Although the authorities began the war with the common purpose of avoiding the mistakes of World War I, and in particular the epidemic of shell shock and other post-combat disorders, their principal weapons were strict regulations about diagnostic terms, restrictive pension criteria and strategies to prevent premature discharge from the forces.²⁴ The belief that manpower resources were not being used effectively provided the main impetus for screening. The increasingly egalitarian stance adopted by some military psychiatrists and psychologists was critical of traditional, class-based selection methods. In April 1940, Lt Colonel Ronald Hargreaves used Penrose-Raven Progressive Matrices, a pre-war test designed to measure innate intelligence, to screen unsuitable recruits.²⁵ As a trial, matrices were given to servicemen diagnosed with effort syndrome undergoing treatment in the special treatment unit at Mill Hill Hospital. The results purported to show that "neurotic men have less consistent test scores [over time] than normal people" and that the scores of the former improved with treatment.²⁶ Army psychiatrists concluded that about 4% of all intakes were unsuitable for combatant units.

Considerable effort was put into instruments designed to identify types of soldier and, in June 1941, a Directorate of

Selection Personnel was established for the British Army.²⁷ In the following year, new recruits were enlisted into the General Service Corps and posted to Primary Training Centres where they completed a battery of intelligence and aptitude tests. Each serviceman was interviewed by a personnel selection officer, who made recommendations about the man's deployment. Recruits with low test scores, or who were regarded as unstable, were referred to military psychiatrists who could recommend special employment or discharge.²⁸ Hence, the primary aim of this system was to ensure that servicemen were placed in suitable trades or occupations rather than the identification of potential psychiatric casualties. With more modest aims, the British army rejected far fewer recruits (1.4%) than the US Army (7.2%) during World War II.²⁷ The limited screens employed by the British reflected a widespread mistrust of psychological testing and the reduced levels of choice offered by a much smaller population.

Outcomes of screening: United States

By spring 1943, it had become obvious from the large numbers of psychiatric casualties that the screening programme had failed in its preventive role. Admissions for neuropsychiatric disorders had risen to 20,000 per month in the US alone and reached a peak of 31,000 in August. During the last month of the Buna-Gona campaign, the neuropsychiatric admission rate was 60–70 per 1000 troops for the entire Southwest Pacific area – four times that for the American Expeditionary Force during World War I.^{29,30} Worse still, the programme was having an adverse effect on the war effort. Selection programmes rejected too many people, adding to the general manpower problems.³¹ Official directives documented the disillusionment, which culminated in the War Department Technical Bulletin (TB MED 33) issued on 21 April 1944. This stated that rejection for neuropsychiatric reasons should only be made in “those cases in which the history and examination clearly indicate the existence in the past and/or present of a personality disorder of partially or completely incapacitating degree” and established that “individuals with minor personality defects and neurotic trends could be of service”.

According to official statistics prepared by the US Office of the Surgeon General, 7.2% of those registered for the draft were turned down for neuropsychiatric reasons and a further 4.3% because of low intelligence or educational difficulties.³² This combined disqualification rate was six times higher than that for World War I.^{33,34} Ginzberg *et al.* put the rate slightly higher at 9.4%, representing 1,686,000 men.⁹ Discharges for neuropsychiatric disorders reached 504,000 (5%), significantly higher than in World War I, leading some to conclude that “the actual incidence of neuropsychiatric conditions” was also greater.³⁰ Hence, despite a tough rejection policy, “large numbers of men with emotional difficulties of all severities kept turning up”.³⁵

Outcomes of screening: United Kingdom

In the UK, the Director of Manpower Planning at the War Office argued for the retention of aptitude screening in the post-war period so that it could be employed during National Service. Yet the need to make economies and an enduring suspicion of these methods brought an end to the General Service Corps in 1948. Henceforth, recruits were admitted directly to corps or regiments after a preliminary selection test, the remainder of their assessment being completed during training. The primacy of the regimental system was

restored and the part played by psychological testing in allocating servicemen to different units downgraded. Nevertheless, the principle that these techniques could be used for officer and trade selection had been established and remains so to this day.

Why did screening fail in World War II?

At the same time that doctors and officials had been calling for a screening programme, voices were also heard warning against over-optimistic claims.³⁶ Based on his experience treating World War I veterans, Kardiner wrote “I should hesitate to offer any criteria that can be used to predict that a given candidate will have a traumatic neurosis”.³⁷

The imprecise nature of screening instruments was raised by Aita, who noted that it was “frequently difficult . . . to classify the exact reason for disqualification” in borderline conditions.³⁸ Later, he compared 154 servicemen whose initial assessment had predicted a borderline outcome with 150 servicemen who had been identified as likely to be successful. Although psychiatric casualties were three times higher in the borderline group, for every two soldiers who failed, three proved efficient and some were outstanding.³⁹ Aita concluded that the screening techniques of 1941 had little value because they relied on past behaviour. Predicting how these men would perform in circumstances quite different from anything they had experienced hitherto involved guesswork.

In the immediate post-war period a number of studies were conducted to discover why the screening programmes had failed. A broad-ranging survey of personality inventories by Ellis and Conrad concluded that “except in samples containing an unusually large proportion of psychiatrically ‘positive’ cases, the number of cases *falsely* classified as positive by the inventory generally exceeds, by a great deal, the number *correctly* classified as positive”.⁴⁰

Egan and colleagues followed up 2054 men rejected by the Selective Service System on psychiatric grounds, but later inducted into the army – an elegant natural experiment. Although their sample was not entirely random, the study showed that only 18% had subsequently been discharged from the forces on psychiatric grounds.⁴¹ Of the rest, 82% had given “satisfactory duty” as compared with 94% of all enlisted personnel. They estimated that 1,992,950 men had been unnecessarily rejected for military service on psychiatric grounds during World War II.

The variables used to reject those thought vulnerable to later breakdown did, indeed, have low predictive power. Brill and Beebe compared the rates of psychiatric admission for World War II servicemen who had been assessed as being at risk with those considered well-adjusted.⁴² In those without such a history, 2% had been admitted to a psychiatric facility compared with 29% of the marginal or predisposed group. If allowance was made for those discharged with a diagnosis of personality disorder but never formally admitted for psychiatric care, the total rose to 35%. Although this research confirmed that the likelihood of admission was substantially higher in the identified population, it also demonstrated the impracticalities of screening for such predispositions. At least 65% of an at-risk population rendered satisfactory service. Had the examiners rejected everyone from this marginal group at induction, the army would have been deprived of one million men who never broke down.

As regards the related question of how those diagnosed with psychiatric disorders actually performed in combat, Plesset followed up 138 soldiers who in training had shown

"sufficient adjustment difficulty to necessitate psychiatric attention".⁴³ After 30 days of combat, 137 remained on active duty, and one had received a gallantry medal. By the end of the war, 120 remained on duty and eight had been awarded Bronze Stars. A further study investigated the performance of 395 men diagnosed during training with mild psychological disorders. Subjected to combat during the Ardennes campaign, only nine became psychiatric casualties during the first 50 days of battle. A survey of admissions to the casualty clearing station showed no abnormal increase in evacuations for other reasons.⁴⁴

A random sample of 316 infantry and armoured troops, who had been treated in forward psychiatric treatment centres, were followed up to assess their effectiveness when returned to combat units. Only 84 (26.6%) were rated by their commanders as performing with a rating of "good" or "fair" within three months of their redeployment. Those who had achieved "good" or "fair" ratings were largely drawn from two diagnostic groups: 68.8% of those with a pre-existing conversion disorder and 67.7% those with no pre-service psychological illness, while 51.2% of servicemen with "neurosis existing prior to induction" also performed reasonably.⁴⁵ These results showed that psychiatric casualties were not directly correlated with pre-existing disorders and that to eliminate all those with a history of mental illness would deprive the armed forces of valuable manpower.

The measures themselves showed unacceptable variation or poor inter-rater reliability. For example, when psychiatrists were preferred to pencil and paper tests, the accuracy of prediction was no better. Variations between induction centres were so vast as once again to bring the system into disrepute – a difference of 35 times in rejection rates.^{9,11}

The premise that selection would prevent psychiatric casualties failed for one further reason. The main cause of combat fatigue was not a soldier's pre-service personality but the intensity of battle itself.⁴⁶⁻⁴⁸ A study by Brill and Beebe found that the majority of US servicemen admitted with psychiatric diagnoses in 1942-43 had pre-existing emotional disorders. By 1944-45, most admissions for psychoneurosis were as a result of exposure to combat, and 50% were soldiers who had been assessed as clinically normal at entry.³⁵

Korean War

The US army, to its credit, put into practice some of the lessons learned in the aftermath of World War I, namely that screening was more effective if variables could be measured accurately.³³ A retrospective study of a rapid screening procedure applied in 1943-44 to assess intellectual and emotional deficiencies in the US Marine Corps had reportedly identified 78% of those subsequently discharged, though it also generated 11% false-positives.⁴⁹ Nevertheless, it was also shown that the judgements of drill instructors in weeding out unsuitable men proved no less efficient than the screen instruments, suggesting that these were observable disorders rather than potential vulnerabilities. In the light of similar studies, the emphasis placed on intelligence was increased, while less attention was paid to the detection of psychological vulnerability, and a more liberal policy was adopted towards so-called borderline cases.

As a result of more modest aims, the rate of neuro-psychiatric rejections fell from the 7.2% recorded during World War II to 2.1% during the Korean conflict. However, those excluded on grounds of mental deficiency rose from 4.3% to 13.4%, largely because of the emphasis given to intelligence testing. In the aftermath of the war, Voth argued that "exception is taken to the premise that brief psychiatric

screening is of value in predicting possible psychiatric casualties, except in certain obvious cases".⁵⁰

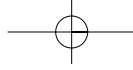
Glass and colleagues retrospectively examined a random sample of 505 inductees, who had entered training in August 1951 and hence already passed through the psychiatric screening process.³² An analysis of service records and evaluations by unit commanders showed that prediction of military effectiveness was unreliable. For combat and combat-support troops deployed to Korea, forecasts of below-average or poor performance had been unduly pessimistic. Troops sent overseas to non-combat theatres also performed far better than predicted. Greater accuracy was obtained with servicemen assigned non-combat roles in the United States, screening having identified 88.8% of those who were unable to function. Yet most of these servicemen had broken down during or shortly after training, and were soldiers who had experienced difficulties adjusting from civilian to military life. The authors concluded that overt signs of psychiatric abnormality could only forecast military effectiveness over a relatively brief period.

Post-1953

The search for an accurate screening instrument did not cease after the Korean War.⁵¹ The Fort Ord Inventory (FOI) was designed to identify affective disturbances that would impair military service. Tests on 15,000 recruits confirmed the design of four scales, which differentiated between those with leadership potential and those with poor adjustment qualities: delinquency, neurosis, fake bad (malingering) and femininity.⁵² Although the authors concluded that they could detect "the major types of emotional abnormalities", the FOI was not designed to predict how soldiers might perform in combat. A follow-up study of 134 naval recruits enlisted between 1960 and 1961, who had been rejected on psychological grounds but had been purposely allowed to graduate from training, found that two years later 97 (72.4%) were still on active duty.⁵³ It was hypothesised that most had experienced "emotional growth" during their service and that the disturbances picked up on screening were "merely transitory". The authors appeared to pay little attention to the most obvious explanation – that the instruments performed badly – though they did conclude that "psychiatric screening has . . . limited value".

Huffman suggested that a factor in the low incidence of psychiatric cases during the Vietnam War was the effectiveness of screening.⁵⁴ However, the US Army had not employed an organised screening programme for inductees to assess psychological vulnerability during the conflict. Glass and his colleagues had raised sufficient doubt about the accuracy of psychiatric predictions of both military effectiveness and the likelihood of developing psychological disorders.³² Furthermore, the military encountered recruitment difficulties throughout what became an unpopular war, so that there was little scope to reject both volunteers and conscripts.

Nevertheless, the military had some success with the more limited goal of attempting to identify recruits who would complete basic training. Elements of an 82-item questionnaire dealing with personal adjustments and attitudes, which was given to 9194 airforce trainees, were said to predict outcome with "uncanny accuracy".⁵⁵ Subsequently, the Health Opinion Survey (HOS) applied to 1462 recruits at their induction and to the 1167 who completed their training gave only broad statistical risk predictions.⁵⁶ The raw data showed that the scale had unacceptably low specificity and sensitivity for routine use.



Another study, which used a complex battery of physical and psychological measures to predict who would complete basic training, gave borderline results for female recruits but proved unreliable for males.⁵⁷ Some successes were recorded, though the variables that could be measured most accurately were straightforward, largely concerned with age, education or reason for enlistment,^{58,59} reiterating one of the basic requirements for screening that variables be measured accurately. The US Air Force persisted with personality assessments to assess those in training, but only achieved a predictive power of 50%.⁶⁰ Not deterred, a research programme at Wilford Hall Medical Center, Texas, designed the Air Force Medical Evaluation Test Programme (AFMET) to identify trainees with significant psychological problems.⁶¹ Although AFMET has plausibly saved valuable resources through early discharges, the system did encounter problems, including "excessive misidentifications".⁶² A further attempt to assess outcomes in US Air Force trainees suggested promising results, though the authors conceded that further research was needed to improve accuracy.⁶³ By 1990, disillusionment with personality testing was widespread, not just in the military.⁶⁴

Post-traumatic stress disorder (PTSD)

The official recognition of PTSD in 1980 opened a new chapter in the history of psychological screening as investigators attempted to identify risk factors for this high-profile diagnosis. A meta-analysis by Brewin *et al.* of 45 retrospective and prospective studies used statistical techniques to increase the predictive power of each investigation and overcome some of the problems associated with small sample sizes.⁶⁵ Overall, the results showed that no single variable was a particularly powerful predictor of developing PTSD. The best indicator, though by no means exceptionally strong, was the intensity of the trauma itself. This was not a new finding, having been identified in World War II studies of combat fatigue. By definition, such a factor cannot be used in recruitment or pre-deployment screening.

Associations with PTSD were noted for other variables, which could be measured before combat, and included gender, age, social class, intelligence, education, family, personal histories of psychiatric disorder and, more controversially, childhood abuse. Yet all contributed very little to the overall risk. The associations were statistically significant (because meta-analytic techniques had increased the sample size) but actually were very small. Little heterogeneity was found amongst the risk factors identified, and only previous psychiatric history emerged as a uniform variable. As a result, Brewin concluded that "attempts to identify a common set of pre-trauma predictors of PTSD that will be equally valid across different traumatized groups are premature".⁶⁵

Current policy: Bosnia and Kosovo

In February 1996 all US military personnel deployed to Bosnia for more than 30 days were required to complete a mental health screen as they returned to their home station. Respondents who exceeded pre-established, cut-off criteria completed a secondary survey and were then interviewed by a mental health care provider to determine referral needs.⁶⁶ However, as part of the Kosovo operations in April 2000 an element of pre-deployment screening was introduced, though it had the primary purpose of detecting existing morbidity (acute stress disorder symptoms and reactions to traumatic exposures) rather than predicting or preventing

future problems.⁶⁷ Results from the psychological surveillance programmes in Bosnia and Kosovo have shown that it is possible to monitor changes in the mental health status of personnel during deployments and that a large-scale screen can effectively identify soldiers requiring referral. However, the instrument provides a snapshot of the soldier's current psychological state without being able to predict longer-term outcomes.

We also draw attention to the Recruit Assessment Program (RAP) now instituted to collect baseline data from all US military personnel on entry to the armed forces.⁶⁸ Whilst, at present, this is not intended to be a return to the old days of screening for psychological vulnerability, it will offer an invaluable resource on which to test predictions and models of subsequent military performance and mental health. As such the RAP will provide extensive health data from large numbers of men and women to assist in the identification of risk factors for psychiatric illnesses.

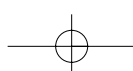
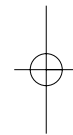
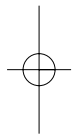
DISCUSSION

Although screening for psychological vulnerability to breakdown under stress remains a most desirable goal, this review suggests that its achievement has been elusive. By contrast, screening has been shown to be effective for certain well-measured variables, such as low intelligence and psychosis, which are powerful predictors of failure in military service. Instruments to assess aptitude have been progressively refined and are used by all the main military powers to assist officer selection and trade deployment. Screening has also been shown to identify accurately those who are unlikely to complete their basic training, saving valuable resources.

However, screening becomes more problematic when applied to prediction of breakdown under stress. Some key variables, such as leadership, morale, intensity and result of battle, preparedness, which contribute to functioning, cannot be known at induction. The imprecision of current measurement also presents an obstacle to identification. Our knowledge of what makes people subject to PTSD remains relatively crude, including past psychiatric history, social class, family history and childhood abuse. None of these have sufficient explanatory power to justify a screening programme.⁶⁵

While no variable or combination of variables has yet been found that will accurately identify vulnerability, some historical data suggest that significant predictors may exist. In their retrospective study, Brill and Beebe discovered that "the vast majority of army admissions in 1942 and 1943 involved men with clear-cut, pre-existing emotional disorders", while in 1944 and 1945, when combat was the dominant factor, 50% were found to have a history of psychological problems.³⁵ Although Aita concluded that the screening techniques of 1941 were too imprecise to justify their continued use, these instruments had succeeded in identifying psychiatric casualty rates that were three times higher than in the controls. The problem was that 60% of those identified as borderline proved to be efficient soldiers, undermining any gains that would have accrued in rejecting potential breakdowns. Hence, even if our current knowledge is inadequate, it is possible that further research into psychosocial and possibly genetic factors that convey vulnerability may contribute to the design of an effective screening instrument.

There still remains the problem of how to avoid rejecting those recruits with a history of psychological illness who in practice would have proved to be good soldiers. The disastrous screening programme of the early years of World



War II remains a salutary example of the damage that inaccurate instruments can inflict.

Insufficient consideration has been given to the side-effects of screening. It remains uncertain what would happen if someone were identified as vulnerable, though the consequences of such a decision are of considerable importance. First, the individual would be given a psychiatric label, which is likely to adversely affect their career whether in the military or as a civilian. If retained in the armed forces, then some action should be taken to address that vulnerability. However, there is no intervention currently available that has been shown to reduce that risk. Alternatively, persons identified as vulnerable might have to be found a low-stress occupation. But do such assignments exist now that the distinction between forward and rear positions has become blurred? No consideration has been given to the effect of screening on an individual's view of himself or herself. From thinking that they are healthy, recruits might now believe themselves to be psychologically unfit, with adverse effects for their self-esteem and behaviour.⁶⁹ If Brewin is correct that social disadvantage, gender and ethnicity are risk factors for PTSD,⁶⁵ then should recruitment from such groups be scaled down?

The belief continues that the armed forces serve a social purpose, other than preparing for war, and that the structure and training provided by military service are of use in their own right. Many have commented that simply excluding those who are at higher risk for adverse outcomes not only reduces the manpower pool, but also misses an opportunity to bring benefit to the lives of people who might otherwise have worse social and psychological futures. If, for example, the military decided to refuse men and women from disadvantaged backgrounds on the grounds that these have been shown to be risk factors for later psychiatric disorder, then not only would traditional sources of recruitment be compromised, but a chance to improve mental health would be lost.

Just as screening for vulnerability needs to be distinguished from screening for aptitude, so it is important to discriminate between screening for actual, as opposed to future, disorders. That significant advances have been achieved in the latter can be seen from the instruments used to test US forces in Bosnia and Kosovo, though difficulties encountered included imprecision, false-positives, false-negatives and reluctance in the target population because of stigma. Nevertheless, results from these large-scale programmes have demonstrated that it is possible to identify effectively the soldiers who require psychiatric referral.⁶⁷ These early findings suggest that psychological surveillance, if not actual screening, may yield valuable results when applied to military populations exposed to stress.

ACKNOWLEDGEMENTS

The authors wish to thank Dr Elspeth Ritchie, Ben Shephard and Professor Robert Ursano for their helpful discussion. Edgar Jones was supported by a grant from the Ministry of Defence

Authors' affiliations

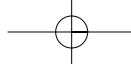
Edgar Jones, Reader in History of Psychiatry, Department of Psychological Medicine, Guy's, King's and St Thomas's School of Medicine, London, UK

Kenneth C Hyams, Consultant, Office of Public Health and Environmental Hazards, Department of Veterans Affairs, Washington DC, USA

Simon Wessely, Consultant, Office of Public Health and Environmental Hazards, Department of Veterans Affairs, Washington DC, USA, and Professor of Psychological Medicine, Guy's, King's and St Thomas's School of Medicine, London, UK

REFERENCES

- Salmon T. The care and treatment of mental diseases and war neuroses ("shell shock") in the British Army. *Mental Hygiene* 1917;1:529-30.
- Bailey P. Direction and elimination of individuals with nervous or mental disease. In: Bailey P, Williams FE, Komora PO, eds. *The Medical Department of the United States Army in the World War, Volume X, Neuropsychiatry*. Washington: US Government Printing Office, 1929:57-86.
- Yerkes RM. Man-power and military effectiveness: the case for human engineering. *J Consult Psychol* 1941;5:205-8.
- Fancher RE. *The intelligence men: makers of the IQ controversy*. New York: W W Norton & Co, 1985.
- Shaw HA. Psychological examining in the United States Army. *Memoirs National Academy of Sciences* 1921;15:22.
- Macfie Campbell C. Selective service and psychiatric issues. *JAMA* 1941;116:1884.
- Porter WC. Military psychiatry and the Selective Service. *War Med* 1941;1:365.
- Porter WC. The military psychiatrist at work. *Am J Psychiatry* 1941;98:318.
- Ginzberg E, Anderson JK, Ginsburg SW, et al. *The lost divisions*. New York: Columbia University Press, 1959.
- Fenton N. A post-war study of a typical group of war neuroses cases in 1919-20 and 1924-25. In: Bailey P, ed. *The Medical Department of the United States Army in the World War*. Washington: US Government Printing Office, 1929:473.
- Berlien IC, Waggoner RW. Selection and induction. In: Glass AJ, Bernucci RJ, eds. *Neuropsychiatry in World War II, Volume 1, Zone of the Interior*. Washington: Office of the Surgeon General, 1966:153-91.
- Bowman KM. Psychiatric examination in the armed forces. *War Med* 1941;1:216-9.
- Pratt JH. Psychiatric factors in medical examination. *War Med* 1941;1:358-63.
- Hilman C. Medical problems encountered in military service. *Ann Intern Med* 1940;13:2206.
- Sutton D. The utilisation of psychiatry in the armed forces. *Psychiatry* 1939;2:133.
- Orr DW. Objectives of the selective service psychiatric classification. *Bull Menninger Clin* 1941;5:131-3.
- Leigh AD. Neurosis as viewed by a regimental medical officer. *Lancet* 1941;1:396.
- Davidson HA. Mental hygiene in our armed forces. *Milit Surgeon* 1940;86:480.
- Baillie W. A summary of 200 neurological and psychiatric admissions from Canadian army service forces. *Am J Psychiatry* 1941;97:760,764.
- Kiene HE, Hassell AS, Miller H. Neuro-psychiatric examination at the R.I. Army induction station. *Am J Psychiatry* 1942;98:509.
- Menninger WC. A condensed neuropsychiatric examination. *War Med* 1941;1:843-53.
- Wittson CL, Harris HI, Hunt WA, et al. Neuropsychiatric examination of recruits. *War Med* 1942;2:944-51.
- Stouffer SA, Lumsdaine AA, Lumsdaine MH, et al. *The American soldier: combat and its aftermath, Volume II*. Princeton, NJ: Princeton University Press, 1949.
- Jones E, Palmer I, Wessely S. War Pensions (1917-1945): changing models of psychological understanding. *Br J Psychiatry* 2002;180:374-9.
- Shephard B. *A war of nerves, soldiers and psychiatrists 1914-1994*. London: Jonathan Cape, 2000.
- Raven JC. Testing the mental ability of adults. *Lancet* 1942;1:115-7.
- Ahrenfeldt RH. *Psychiatry in the British Army in the Second World War*. London: Routledge & Kegan Paul, 1958.
- Crang J. Square pegs in round holes: other rank selection in the British Army 1939-45. *J Soc Army Hist Res* 1999;77:293-8.
- Appel JW. Preventative psychiatry. In: Glass AJ, Bernucci RJ, eds. *Neuropsychiatry in World War II, Volume 1, Zone of Interior*. Washington: Office of the Surgeon General, 1966:389-90.
- Appel JW, Beebe GW, Hilger DW. Comparative incidence of neuropsychiatric casualties in World War I and World War II. *Am J Psychiatry* 1946;103:196-9.
- Deutsch A. Military psychiatry: World War II, 1941-1943. In: Hall J, Zilboorg G, Bunker H, eds. *One hundred years of American psychiatry*. New York: Columbia University Press, 1944:418-41.
- Glass AJ, Ryan FJ, Lubin A, et al. Psychiatric prediction and military effectiveness, Part 1. *US Armed Forces Medical Journal* 1956;7:1435, 1436, 1439, 1442.
- Glass AJ. Lessons learned. In: Glass AJ, Bernucci RJ, eds. *Neuropsychiatry in World War II, Volume 1, Zone of the Interior*. Washington: Office of the Surgeon General, 1966:735-46.
- Strecker EK. *Psychiatry and modern warfare*. New York: Macmillan, 1945.
- Brill NQ, Beebe GW. Some applications of a follow-up study to psychiatric standards for mobilization. *Am J Psychiatry* 1952;109:404, 407-10.
- Anon. Psychiatry and the war. *Am J Psychiatry* 1941;97:975-6.



- 37 Kardiner A. The neuroses of war. *War Med* 1941;**1**:221.
- 38 Aita, JA. Neurologic and psychiatric examination during military mobilization. *War Med* 1941;**1**:775.
- 39 Aita JA. Efficacy of the brief clinical interview method in predicting adjustments. *Arch Neurol Psychiatry* 1949;**61**:170-6.
- 40 Ellis A, Conrad HS. The validity of personality inventories in military practice. *Psychol Bull* 1948;**45**:420.
- 41 Egan JR, Jackson L, Eanes RH. A study of neuropsychiatric rejectees. *JAMA* 1951;**145**:466-9.
- 42 Brill NG, Beebe GW. Psychoneuroses: military applications of a follow up study. *US Armed Forces Medical Journal* 1952;**3**:15-33.
- 43 Plesset MR. Psychoneurotics in combat. *Am J Psychiatry* 1946;**103**:87-8.
- 44 Sharp WL. Fate of 395 mild neuropsychiatric cases salvaged from training period and taken into combat. *Am J Psychiatry* 1950;**106**:801-7.
- 45 Ludwig AO, Ranson SW. A statistical follow-up of effectiveness of treatment of combat-induced psychiatric casualties. *Milit Surgeon* 1947;**100**:51-9.
- 46 Beebe GW, DeBailey ME. *Battle casualties: incidence, morality and logistic considerations*. Springfield, Ill: Charles C Thomas, 1952.
- 47 Blood CG, Gauker ED. The relationship between battle intensity and disease rates among Marine Corps infantry units. *Mil Med* 1993;**158**:340-4.
- 48 Jones E, Wessely S. Psychiatric battle casualties: an inter and intra war comparison. *Br J Psychiatry* 2001;**178**:242-7.
- 49 Miles DW, Wilkins WL, Lester DW, et al. The efficiency of a high-speed screening procedure in detecting the neuropsychiatrically unfit at a U.S. Marine Corps recruit training depot. *J Psychol* 1946;**21**:243-68.
- 50 Voith HM. Psychiatric screening in the armed forces. *Am J Psychiatry* 1954;**110**:752.
- 51 Arthur RJ. Success is predictable. *Mil Med* 1971;**136**:539-45.
- 52 Danielson JR, Clark JH. A personality inventory for induction screening. *J Clin Psychol* 1954;**10**:137-43.
- 53 Plag JA, Arthur RJ. Psychiatric re-examination of unsuitable naval recruits: a two-year follow-up. *Am J Psychiatry* 1965;**122**:534-41.
- 54 Huffman RE. Which soldiers break down: a survey of 610 psychiatric patients in Vietnam. *Bull Menninger Clin* 1970;**34**:343-51.
- 55 Jensen MB. Adjustive and non-adjustive reactions to basic training in the Air Force. *J Soc Psychol* 1961;**55**:33-41.
- 56 McCarroll JE, Kowal DM, Phair PW. The Health Opinion Survey: predicting illness in military trainees. *Mil Med* 1981;**146**:463-8.
- 57 Kowal D, Vogel J, Sharp D, et al. *Analysis of attrition, retention and criterion task performance of recruits during training*. Natick, MA: US Army Research Institute of Environmental Medicine, 1982.
- 58 Plag JA. Pre-enlistment variables related to the performance and adjustment of Navy recruits. *J Clin Psychol* 1962;**18**:168-71.
- 59 Bucky SF, Edwards A. The recruit temperament survey (RTS) as it discriminates between psychoses, neuroses and personality disorders. *J Clin Psychol* 1974;**30**:195-9.
- 60 Lachar D, Sparks JC, Larsen RM et al. Psychometric prediction of behavioural criteria of adaption for USAF basic trainees. *J Community Psychol* 1974;**2**:268-77.
- 61 Crawford SL, Fiedler ER. Development and current status of USAF mental health screening. *Mil Med* 1991;**156**:596-9.
- 62 Bloom W. Changes made, lessons learned after mental health screening. *Mil Med* 1983;**148**:889-90.
- 63 Butters M, Retzlaff P, Gibertini M. Non-adaptability to basic training and the Millon Clinical Multiaxial Inventory. *Mil Med* 1986;**151**:574-6.
- 64 Blinkhorn S, Johnson C. The insignificance of personality testing. *Nature* 1990;**348**:671-2.
- 65 Brewin CR, Andrews B, Valentine JD. Meta-analysis of risk factors for posttraumatic stress disorder in trauma-exposed adults. *J Consult Clin Psychol* 2000;**68**:748-66, 754.
- 66 Martinez J, Huffman A, Adler A, et al. assessing psychological readiness in US soldiers following NATO operations. *Int Rev Armed Forces Med Serv* 2000;**73**:139-42.
- 67 Wright KM, Huffman AH, Adler AB, et al. Psychological screening program overview. *Mil Med* 2002;**167**:853-61.
- 68 Barrett DE, Duque D, Engel CE, et al. The Recruit Assessment Program: A program to collect comprehensive baseline health data from US military personnel. *Mil Med* 2002;**167**:44-7.
- 69 National Screening Committee. *First Report of the National Screening Committee*. London: HMSO, 1998.

Author queries: PubMed does not include the title abbreviations for the following journals, so we would like to include their names in full. Please could you provide?
War Med (refs 7, 12, 13, 21, 22, 37, 38).
Milit Surgeon (refs 18, 45)
Arch Neurol Psychiatry (ref 39)
Int Rev Armed Forces Med Serv (ref 66)

